General Pharmacology

- Pharmacokinetics
- Pharmacodynamics
- Drug-drug interactions

1. **Pharmacokinetics:** Describe what the body does to the drug. This includes: absorption, distribution, biotransformation and excretion of durg.
2. **Pharmacodynamics**: Describe what the drug does to the body. This includes the mechanism of action, pharmacological action, adverse effects, and the pharmadodynamic drug-drug interaction.
3. **Pharmacotherapeutics:** Describe uses of drug for prevention, diagnosis and treatment of diseases.

Drug: Chemical substance that affects biologic systems of living organism.

Drug nomenclature:

1. **Chemical name:** Describe chemistry of the drug e.g. acetyl salicylic acid.

2. **Generic (Non-proprietary or approved) name:** This is the abbreviated and approved name of the drug. It is the official medical name assigned by the *producer* in collaboration with the food & Drug Board and Nomeneclature committee. Each drug has *only one name* all over the world and it is not capitalizes e.g. aspirin, atenolol, amlodipine, and captopril. *Very few drug have two generic names e.g ("paracetmol-acetaminophen", "neostigmine-prostigmine", "epinephrine-adrenaline", "norepinephrine-noradrenaline", "meperidine-pethidine").*

3. **Brand (Proprietary or Trade) name:** These are names given to the drug by the manufacturing and marketing company, and they are *copyrighted* terms selected by the manufacturer e.g. Aspocid, Inderal, Tonormin, Myodura, and Capoten.

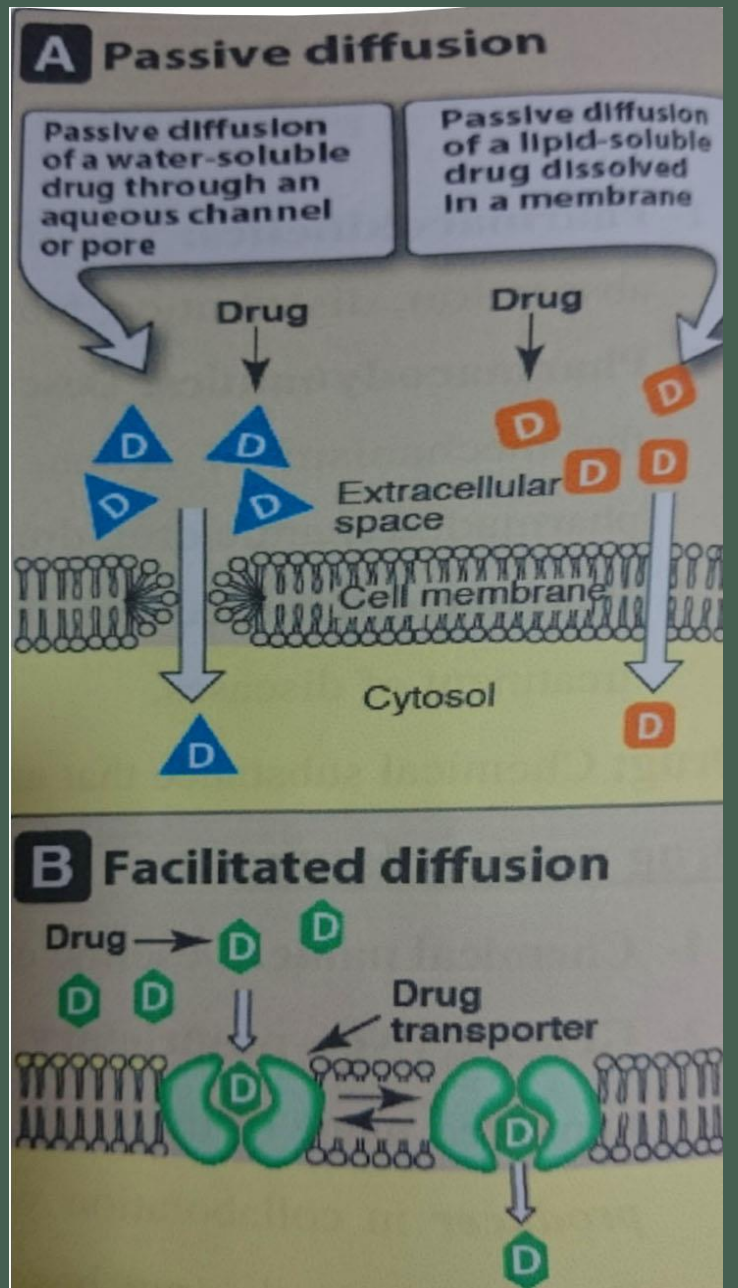
PHARMACOKINETICS

ABSORPTION

Definition: Passage of drugs from site of administration to systemic circulation.

the mechanisms of drug absorption follow the mechanisms of drug movement across the biological membranes, which include:

1. **Passive diffusion:** The most common and most important mechanism, it includes:
   - **A.** Rapid movement of lipid-soluble drug across the cell membrane.
   - **B.** Movement of water-soluble drugs across the aqueous channels (water pores).



2. Facilitated diffusion:

- No energy is required as the drugs are carried to inside of the cell ***according to the concentration gradient*** by :

a. Carrier protein.

b. Drug transporter.

3. Active transport:

Energy is required because the drug movement may be ***against the concentration gradient*** by :

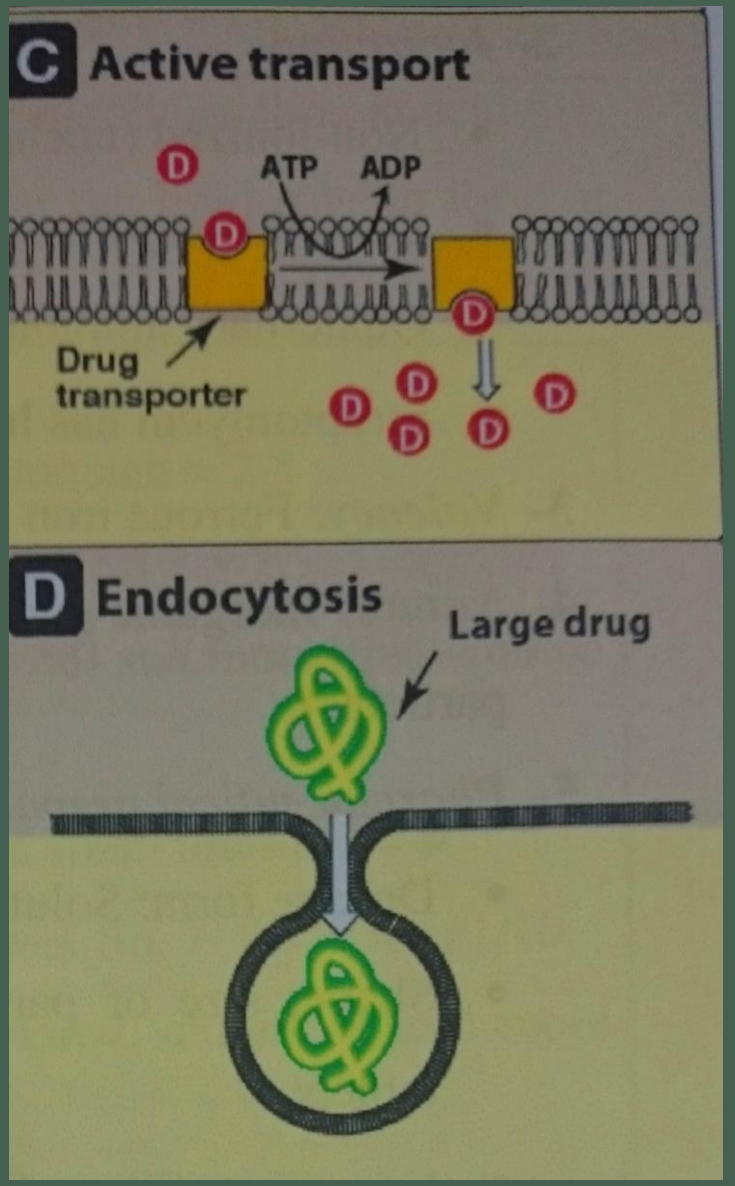
a. Drug transporter.

b. P-glycoprotein drug transporter extrudes drug outside the cells, and it is responsible for drug resistance.

4. Endocytosis and exocytosis:

Usually occur by drugs of high molecular weight. The drug binds to the cell membrance, dips in and enveloped by the cell membrane, a tear in the cell membrane allow the drug to move inside/ outside the cell.

The tear is healed immediately.



2. Factors affecting absorption:

A) Factors related to the patient:

1. Route *of administration:* I.V. and inhalation > I.M. > S.C. > Oral > Topical.

2. Absorbing surface:

- Vascularity (Alveoli > Skeletal muscle > S.C.tissue).
- Surface area (Alveoli > Intestine > Stomach).
- Pathological conditions: Diarrhea & malabsorption → ↓ oral absorption.

3. Systemic circulation :
H.F. & shock → ↓ absorption → oral and I.M. routes are not suitable.

4. Specific factors: Intrinsic factor is essential for vitamin B12 absorption.

B) Factor related to the drug:

1. Water and lipid solubility:

- Both are needed for absorption
- Completely water-insoluble compounds are not absorbed (e.g. barium chloride).
- ↑Lipid solubility → ↑ absorption (lipid /water partition coefficient)

2. Ionization:

- Non-ionized (uncharged) → better absorption
- Depends on *pKa of the drug* and *pH of the medium*
- Quaternary ammonium compounds → ionized → poor absorption
- Streptomycin has high pKa → always ionized → not absorbed orally

3. Valency : Ferrous iron (Fe^{+2}) is absorbed better than ferric iron (Fe^{+3})
4. Nature: Inorganic compounds (small particles) > organic compounds (large particles)
5. Pharmaceutical preparation:

- Dosage form: Solution > Suspension> tablet
- Shape, size of particles and rate of disintegration and dissolution of tablets
- Excepient (filler): Ca^{+2} salts → ↓ oral absorption of tetracyclines